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ON-SITE AIR BAG NON-DEPLOYMENT INVESTIGATION

CASE NUMBER - IN-06-033
LOCATION - WISCONSIN
VEHICLE - 2005 CHEVROLET COBALT
CRASH DATE - October 2006

Submitted:

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The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points be coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants.

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems.

Technical Report Documentation Page

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15. *Supplementary Notes* On-site air bag non-deployment investigation involving a 2005 Chevrolet Cobalt with manual safety belts and dual stage front air bag system.			
16. *Abstract* This report covers an on-site investigation of an air bag non-deployment crash that involved a 2005 Chevrolet Cobalt (case vehicle), which ran-off-road and impacted a tree. This crash is of special interest because the case vehicle was equipped with multiple Advanced Occupant Protection System (AOPS) features, including dual stage air bags that did not deploy, and the case vehicle's front right passenger [15-year-old, female] sustained fatal injuries. The case vehicle was traveling east in the eastbound lane of a two lane county roadway. The case vehicle departed the south side of the roadway, vaulted over a driveway and the front impacted a telephone utility box and then a clump of large trees. The case vehicle's driver and front right passenger air bags did not deploy as a result of the impact with the clump of trees, possibly due to the yielding nature of the tree impact or power loss due to movement of the ignition switch just prior to the impact. The driver, front right passenger and back right passenger were all unrestrained. The driver and both passengers sustained police reported "A" (incapacitating) injuries and were transported to a hospital. The driver and back right passenger were admitted. The front right passenger died of her injuries 4 hours and 33 minutes following the cash. The back right passenger also subsequently died of her injuries.			
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TABLE OF CONTENTS

IN-06-033

Page No.

BACKGROUND IN-06-033

This investigation was brought to NHTSA's attention on or before October 26, 2006 by a news story in a Minnesota newspaper. This crash involved a 2005 Chevrolet Cobalt (case vehicle) that ran-off-road, vaulted over a driveway and impacted a telephone utility box and then a clump of trees. The crash occurred in October 2006, at 7:55 p.m., in Wisconsin and was investigated by the applicable county sheriff department. This crash is of special interest because the case vehicle was equipped with multiple Advanced Occupant Protection System (AOPS) features, including dual stage air bags that did not deploy, and the case vehicle's front right passenger [15-year-old, White (non-Hispanic) female] sustained fatal injuries. In addition, the case vehicle was equipped with an Event Data Recorder (EDR). This contractor inspected the case vehicle on November 6, 2006 and inspected the scene on November 7, 2006. A partial interview was conducted with a relative of the case vehicle's driver on November 6, 2006. This report is based on the sheriff's department crash report and on-scene photographs, scene inspection, vehicle inspection, EDR data, front right passenger's autopsy records, occupant kinematic principles, and this contractor's evaluation of the evidence.

SUMMARY

The case vehicle was traveling east on a two lane county roadway. The case vehicle departed the south side of the roadway. The case vehicle vaulted over a driveway, the front end impacted a telephone utility box (event 1), and then the front right impacted a clump of large trees (event 2). A branch from one of the trees broke off and impacted the top of the case vehicle and broke out the backlight (event 3). The case vehicle's driver and front right passenger air bags did not deploy as a result of the impact with the clump of trees, possibly due to the yielding nature of the tree impact or power loss due to movement of the ignition switch just prior to the impact. The case vehicle rotated clockwise approximately 90 degrees and came to rest heading southwest.

The CDCs for the case vehicle were determined to be: **12-FC99-1** (0 degrees) for the impact with the telephone utility box (event 1). Damage from the subsequent tree impact overlapped this impact, so only a partial CDC could be assigned. The CDC for the tree clump impact (event 2) was determined to be: **12-FZAW-6** (0 degrees) and **00-TZDW-2** for the tree branch impact to the top plane (event 3). The WinSMASH reconstruction program could not be used to reconstruct the case vehicle's Delta Vs for the tree clump impact because yielding object impacts are out-of-scope for the program (i.e., the initial tree impacted was displaced in the ground and broken off at the root). However, the WinSMASH program, barrier algorithm, was used to determine a barrier equivalent speed (BES) based on the case vehicle's front crush profile. The BES was determined to be 88 km.p.h. (55 m.p.h.). The case vehicle's EDR recorded a maximum total velocity change of 96 km.p.h. (59.84 m.p.h). The case vehicle was towed due to damage.

The driver, front right passenger and back right passenger were all unrestrained. The driver and both passengers sustained police reported "A" (incapacitating) injuries and were transported to a hospital. The driver and back right passenger were admitted. The front right passenger died 4 hours and 33 minutes following the crash. The back right passenger also subsequently died.

Crash Environment: The trafficway on which the case vehicle was traveling was a two-lane, major county roadway, traversing in an east and west direction. The roadway had one lane in each direction and was bordered by gravel shoulders. The eastbound travel lane was 3.7 meters (12.1 feet) in width. The westbound travel lane was 3.8 meters (12.5 feet) in width. The south shoulder was 1.6 meters (5.2 feet) in width. The north shoulder was 1.7 meters (5.6 feet) in width. The roadway grade in the area of roadway departure was 6% negative. The speed limit was 89 km.p.h. (55 m.p.h.). At the time of the crash the light condition dark, the weather was cloudy, and the roadway pavement was dry, traveled bituminous with an estimated coefficient of friction of 0.68. The traffic density at the time of the crash was most likely light, and the site of the crash was rural. See the Crash Diagram at the end of this report.

Figure 1: Approach of case vehicle eastbound to roadway departure, number on roadway indicates meters to impact

Pre-Crash: The case vehicle was traveling east in the eastbound lane (**Figure 1**). The case vehicle's driver was intending to continue eastbound. The case vehicle departed the south side of the roadway. The crash occurred on the south side of the roadway on the edge of a wooded area. It is not known why the case vehicle departed the roadway. It is not known if the driver took any actions to avoid the crash.

Figure 2: Overview of path of case vehicle, flag at edge of driveway shows track of case vehicle's left side tires

Crash: After the case vehicle departed the south side of the roadway, it crossed the south shoulder and the right side tires entered the grass. The case vehicle then encountered the edge of a driveway (**Figure 2**), vaulted and was airborne for approximately 18 meters (59 feet). The case vehicle touched down in the grass (**Figure 3**) and traveled an additional approximate 24 meters (79 feet) where the center front of the case vehicle impacted and ran over a telephone utility box (event 1). The case vehicle traveled an additional approximate 15 meters (49 feet) and the front right impacted a clump of large trees (event 2).

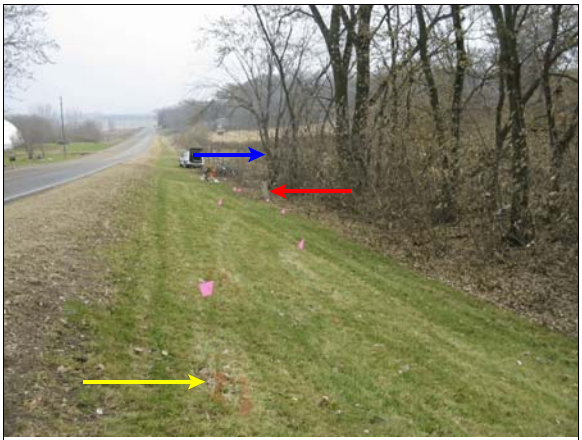

Figure 3: Vehicle touchdown location (yellow arrow) from vault and approach to telephone utility box impact (red arrow) and impact with clump of trees (blue arrow)

The center right of the case vehicle initially engaged the leading tree in the clump and then the front right engaged a tree immediately behind and to the right of the first tree (**Figures 4** and **5**). The first tree was displaced in the ground and broken off at the root. It appeared that a branch from this tree also broke off and impacted the top of the case vehicle and broke out the backlight (event 3). The case vehicle's driver and front right air bags did not deploy as a result of the impact with the clump of trees, possibly due to the yielding nature of the impact with the first tree or power loss due to movement of the ignition switch just prior to the impact. See the discussion below under the "**Case Vehicle**" and "**Crash Data Recording**" sections for further information regarding the ignition switch problem and air bag non-deployment.

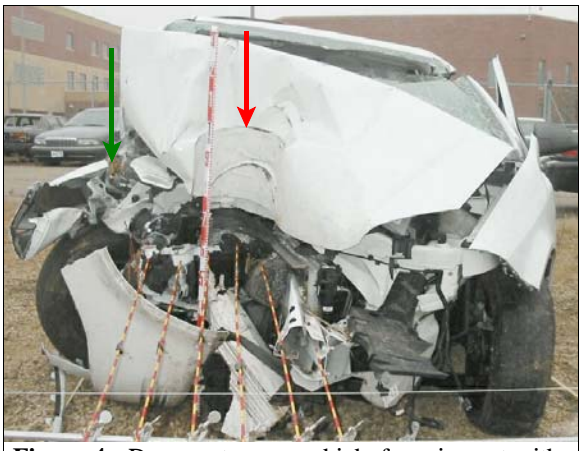

Figure 4: Damage to case vehicle from impact with clump of trees, red arrow shows impact location of tree that broke off, green arrow shows impact location of second tree, vertical scale in tenths of meter

Post-Crash: As a result of the tree impact, the case vehicle rotated clockwise approximately 90 degrees and came to rest heading southwest (**Figure 6**). At final rest the case vehicle was approximately 3 meters (10 feet) north of the impacted clump of trees.

Figure 5: Police on-scene photo of impacted clump of trees, arrows shows broken/uprooted tree

CASE VEHICLE

The 2005 Chevrolet Cobalt was a front wheel drive, four-door sedan (VIN: 1G1AK52F657-------) equipped with 2.2L, L4 engine and a four-speed automatic transmission. The front seating row was equipped with bucket seats with adjustable head restraints, tilt steering column, dual stage driver and front right passenger air bags; driver and front right passenger manual, three-point, lap-and-shoulder safety belt systems with adjustable upper anchors, usage sensors and pretensioners. The back seating row was equipped with a bench seat with folding backs, non-adjustable head restraints in the outboard seating positions and manual, three-point, lap-and-shoulder belts in all three seating positions. In addition, the case vehicle was equipped with a LATCH system for securing child

Figure 6: Red arrow shows impacted clump of trees, yellow arrow shows area of case vehicle's final rest

safety seats. Side curtain air bags were an option, but the case vehicle was not so equipped. Four-wheel anti-lock brakes were also an option, but it is unknown if the case vehicle was so equipped. The case vehicle's specification wheelbase was 262 centimeters (103.1 inches). The case vehicle's odometer reading at the time of the vehicle inspection is unknown because the case vehicle was equipped with an electronic odometer.

Certain 2005 Chevrolet Cobalts were subject to one of two conditions that required recall to a dealership for correction. See attached General Motors (GM) bulletin and GM Vehicle Inquiry System Summary (**Figures 14-18**) at the end of this report. The first condition involved possible reversal of the steering column mounted air bag module wiring. The second condition involved possible loss of air conditioning due to voltage spikes from abnormal fan switching. The documentation on the case vehicle indicated that it was subject to the air conditioning related condition. The documentation indicated that the vehicle was returned to the dealership and the condition was corrected by replacement of the air conditioning jumper harness on January 2, 2006.

CASE VEHICLE DAMAGE

Figure 7: Right side view of crush to front of case vehicle from impact with clump of trees

Figure 8: Top view of crush to front of case vehicle from impact with clump of trees, each increment on rods is 5 cm (2 in)

Exterior Damage: The case vehicle's initial impact with the telephone utility box involved the center portion of the front bumper. The precise location of the damage on the front bumper from the telephone utility box could not be determined due to the overlapping damage from the subsequent tree impact and missing portions of the front bumper fascia. The case vehicle's impact with the tree involved the front right portion of the case vehicle. The front bumper, grille, hood, and right fender were directly contacted and crushed rearward. The direct damage began at the front right bumper corner and extended approximately 45 centimeters (17.7 inches) along the front of the of the vehicle. The front crush profile was taken at the bumper level. The maximum residual crush was determined to be 121 centimeters (47.6 inches) occurring at C_3 (**Figures 7** and **8**). The direct damage from the tree branch impact involved the roof and the backlight. There was a dent located near the right "C"-pillar and the backlight was broken out. The table below shows the case vehicle's front crush profile.

***Case Vehicle Damage** (Continued)* IN-06-033

Units	Event	Direct Damage		Field L	C_1	C_2	C_3	C_4	C_5	C_6	Direct	Field L
		Width CDC	Max Crush								±D	±D
cm	2	45	121	49	32	97	121	111	98	91	25	0
in		17.7	47.6	19.3	12.6	38.2	47.6	43.7	38.6	35.8	9.8	0.0

The case vehicle's right side wheelbase was reduced 58 centimeters (22.8 inches). The left side wheelbase was extended 5 centimeters. Induced damage involved the left fender, hood, roof, right front door, right "A"-pillar and right roof side rail. The rescue crew cut the right "A"-pillar and removed the right front door.

The case vehicle's recommended tire size was P195/60R15, and the case vehicle was equipped with tires of this size. The case vehicle's tire data are shown in the table below.

Tire	*Measured Pressure*		*Recommend Pressure*		*Tread Depth*		*Damage*	*Restricted*	*Deflated*
	kpa	psi	kpa	psi	milli-meters	32nd of an inch			
LF	Flat	Flat	207	30	3	4	None	No	Yes
RF	Flat	Flat	207	30	2	3	Wood pieces in inner bead	Yes	Yes
LR	165	24	207	30	5	6	None	No	No
RR	172	25	207	30	4	5	None	No	No

Vehicle Interior: Inspection of the case vehicle's interior (**Figure 9** and **Figures 10** and **11** below) revealed that primarily the right half of the steering wheel was severely bent forward and the steering column was crushed forward and upward (**Figure 12** below) due to driver loading. The driver's knee bolsters had been heavily contacted by the driver's knees and broken out. There were scuff marks on the right instrument panel and the glove box door due to loading by the front right passenger. The front right passenger's seat back was also intruded forward nearly to the instrument panel (**Figure 10** below) due to loading by the unrestrained back right passenger. Passenger compartment intrusion involved the driver's and front right passenger's toe pans, which intruded longitudinally 18 centimeters (7.1 inches) and 23

Figure 9: Overview of steering wheel, instrument panel and windshield from driver's door

centimeters (9 inches) respectively. The brake pedal also intruded longitudinally 18 centimeters (7.1 inches), and the right instrument panel intruded 18 centimeters (7.1 inches) longitudinally into the front right passenger's occupant space.

Damage Classification: Based on the vehicle inspection, the CDCs for the case vehicle were determined to be: **12-FC99-1** (0 degrees) for the impact with the telephone utility box (event 1). Damage from the subsequent tree impact overlapped this impact, so only a partial CDC could be assigned. The CDC for the tree clump impact (event 2) was determined to be: **12-FZAW-6** (0 degrees) and **00-TZDW-2** for the tree branch impact to the top plane (event 3). The WinSMASH reconstruction program could not be used to reconstruct the case vehicle's Delta Vs for the tree clump impact because yielding object impacts are out-of-scope for the program (i.e., the initial tree impacted was displaced in the ground and broken off at the root). However, the WinSMASH program, barrier algorithm, was used to determine a barrier equivalent speed (EBS) based on the case vehicle's front crush profile. The EBS was determined to be 88 km.p.h. (55 m.p.h.). The case vehicle's EDR recorded a maximum total velocity change of 96 km.p.h. (59.84 m.p.h). The case vehicle was towed due to damage.

Figure 10: Left side view of steering wheel, instrument panel and displacement of front right seat back and head restraint due to the back right passenger loading the seat back into the front right passenger

Figure 11: Right side view of case vehicle's front seating row, instrument panel, steering wheel and windshield

AUTOMATIC RESTRAINT SYSTEM

The case vehicle was equipped with dual stage driver and front right passenger air bags. Neither of these air bags deployed in this crash. See the following "**Crash Data Recording"** discussion.

Figure 12: Right side view of deformation to steering wheel and steering column

CRASH DATA RECORDING AND ANALYSIS OF AIR BAG NON-DEPLOYMENT

The EDR download file was provided to this contractor by the investigating sheriff's deputy. The data indicated that only a non-deployment

event was recorded. The EDR reports are presented in **Figures 19-24** at the end of this report. The pre-crash data indicated that the case vehicle was traveling 144 km.p.h. (71 m.p.h.) at the 5, 4 and 3 second sample points prior to algorithm enable. Vehicle speed and engine speed were then recorded as 0 km.p.h (0m.p.h.) at the 2 and 1 second sample points. In addition, the other pre-crash data items in this block were recorded as invalid. The system status data indicated that the event recording was complete and the multiple event counter was recorded as 0. The service engine soon lamp and service vehicle soon lamp were both recorded as off. The SIR warning lamp was also recorded as off. The number of ignition cycles the SIR warning lamp was off continuously was recorded as 2,783. The number of ignition cycles since the data trouble codes were last cleared was recorded as 254, and the six diagnostic trouble code columns were all recorded as N/A. These recorded data appeared to indicate that the air bag system was functioning at the time of the crash.

The EDR data also indicated that the vehicle power mode status was recorded as "accessory". This indicates that the ignition switch was not in the "on" position at the time of the tree clump impact. This was supported by information from one of the investigating sheriff's deputies, who reported to this contractor that the ignition switch was found jammed in the "accessory" position following the crash. This may explain why zeros were recorded for vehicle speed and engine speed in the final two seconds of the pre-crash data. It is possible the ignition switch could have been knocked to the "accessory" position by the driver's leg or knee at the time of the vault. This investigation revealed that inadvertent contact with the ignition switch or a key chain in the 2005 Chevrolet Cobalt can in fact result in engine shut-down and loss of power. A GM service bulletin applicable to the 2005-2007 Chevrolet Cobalt entitled "Information on Inadvertent Turning of the Key Cylinder, Loss of Electrical System and No DTCs# 05-02-35-007A (10/25/2006)" describes this potential problem [see attached GM bulletin at the end of this report (**Figure 25**)]. The bulletin indicates that there is a potential for the driver to inadvertently turn off the ignition due to low ignition key cylinder torque/effort. The bulletin indicated this was more likely to occur if the driver is short and has a large and/or heavy key chain attached to the ignition key. The bulletin indicated the condition was documented to occur when a driver's knee contacted a key chain while the vehicle was turning and the steering column was adjusted all the way down. A search of the NHTSA, Office of Defects Investigation (ODI) web site, complaint tab, revealed at least six complaints (ODI identification numbers: 10144299, 10145959, 10129121, 10132335, 10151346, and 10197022) relating to the engine shutting off and loss of power in Chevrolet Cobalts when the ignition switch or key chain was contacted by the driver. Some of the complaints reported a simple "brushing" of the key chain or touching of the ignition switch was all that was required for the engine to shut off. It is not known what role, if any, this may have played in the non-deployment of the air bags. Such a determination would most likely require an analysis of the air bag system and ignition wiring schematic in order to determine if in fact the air bag is capable of deploying when the ignition is switched from the "on" position to the "accessory" position. Such an undertaking was beyond the scope of this investigation.

Analysis of the case vehicle's EDR data in light of the yielding of the first tree contacted during the impact with the clump of trees suggest another possible reason for the non-deployment of the driver and front right passenger air bags in this crash. The slope of the case vehicle's initial longitudinal crash pulse was compared to the slope of the initial longitudinal crash pulse from two

Chevrolet Cobalt deployment files from prior cases. The data indicated that the slope of the case vehicle's initial crash pulse was not nearly as steep as that of the comparison deployment files. It is possible that due to the yielding nature of the initial impact with the clump of trees, the case vehicle's crash sensing algorithm, which must make its deployment decision within the approximate first 50 milliseconds following algorithm enable, predicted that the crash would not be severe enough to require air bag deployment and did not issue a deployment command.

CASE VEHICLE FRONT RIGHT PASSENGER KINEMATICS

Immediately prior to the crash, the case vehicle's front right passenger [15-year-old, White (non- Hispanic) female, 147 centimeters and 45 kilograms (58 inches, 100 pounds)] was most likely seated in an upright position with both feet on the floor. The position of her arms and hands is not known. The position of the passenger's seat track and seat back is not known due to the damage to the seat as a result of loading from the unrestrained back right passenger.

Based on this contractor's vehicle inspection, the case vehicle's front right passenger was not restrained by her manual, three-point, lap-and-shoulder, safety belt system. There was no evidence of load marks on the safety belt or "D"-ring. In addition, the police crash report indicated that the passenger was unrestrained and found trapped between her seat, the instrument panel and right front door.

Just prior to the crash, the case vehicle had departed the roadway, vaulted and become airborne. As a result, the front right passenger may have been bracing against the instrument panel with her hands. As the vehicle touched down, the front right passenger most likely moved forward as well as down and up, and the passenger was displaced to the right and likely contacted the instrument panel. The impact with the telephone utility box, which is small and easily moved, most likely caused little or no movement to the front right passenger. The subsequent impact with the clump of trees caused the passenger to continue forward along a path opposite the case vehicle's 0 degree direction of principal force as the case vehicle decelerated. She slid forward on her seat and her lower legs impacted the lower instrument panel, her knees impacted the glove box door, and her arms, chest, and face impacted the instrument panel. In addition, her seat back was loaded by the unrestrained back right passenger and extensively shoved forward, also forcing her into the instrument panel. As the front right passenger's face impacted the instrument panel, her head restraint was jammed into the back of her head causing a compression of her brain stem, midbrain hemorrhage, cerebrum contusions, cerebral edema, subarachnoid hemorrhage, facial fractures and skull fractures. In addition, the front right passenger sustained rib fractures, a fracture and dislocation of the right clavicle and right humerus fracture due to contact with the instrument panel, as well as multiple contusions, abrasions and lacerations. As the case vehicle rotated clockwise the right side of her body most likely impacted the right front door. She was found by police entrapped between her seat, the instrument panel and the right front door. Rescue personnel removed the right front door and in order to extricate the front right passenger from the case vehicle.

CASE VEHICLE FRONT RIGHT PASSENGER INJURIES IN-06-033

The case vehicle's front right passenger sustained a police reported "A" (incapacitating) injury. She was transported by ambulance to a medical center and then air lifted to a hospital where she was pronounced dead 4 hours and 33 minutes following the crash. The table below shows the front right passenger's injuries and injury mechanisms.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Compression brain stem with bilateral transtentorial (uncal) herniation	critical 140202.5,8	Head restraint, front right seat[1]	Probable	Autopsy
2	Hemorrhage, pinpoint, midbrain, not further specified	critical 140210.5,8	Head restraint, front right seat	Probable	Autopsy
3	Contusions cerebrum including 4 cm on undersurface of right frontal lobe, 1 cm left parietal lobe, and on undersurface of temporal and occipital lobes	severe 140624.4,3	Head restraint, front right seat	Probable	Autopsy
4	Cerebral edema, diffuse, not further specified	serious 140660.3,9	Head restraint, front right seat	Probable	Autopsy
5	Hemorrhage, subarachnoid, diffuse, not further specified	serious 140684.3,9	Head restraint, front right seat	Probable	Autopsy
6	Fractures of orbital plates, not further specified	serious 150200.3,8	Right instrument panel and below	Probable	Autopsy
7	Fracture right frontal and parietal bone, not further specified	moderate 150400.2,1	Right instrument panel and below	Probable	Autopsy
8	Fracture right occipital bone, not further specified	moderate 150400.2,6	Head restraint, front right seat	Probable	Autopsy
9	Fracture nasal bridge, palpable, not further specified	minor 251000.1,4	Right instrument panel and below	Probable	Autopsy
10	Avulsion upper central incisors, numerous, not further specified	minor 251406.1,8	Right instrument panel and below	Probable	Autopsy
11	Fracture ribs: left 2nd and 3rd, anteriorly, not further specified	moderate 450220.2,2	Right instrument panel and below	Probable	Autopsy
12	Fracture right clavicular head, not further specified	moderate 752200.2,1	Right instrument panel and below	Probable	Autopsy
13	Dislocation right clavicle, not further specified	moderate 750230.2,1	Right instrument panel and below	Probable	Autopsy

[1] This occupant was entrapped between the front right seat back, the front right instrument panel, and the interior surface of the right front door. Her seat back was loaded by the unrestrained, back right passenger causing the seat back to intrude into the front right passenger's space impacting and compressing this occupant between the seat back and the instrument panel. Note: the front right headrest (**Figure 10** above) appears to have been driven backwards during the compression process.

***Case Vehicle Front Right Passenger Injuries** (Continued)* IN-06-033

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
14	Fracture right humerus, not further specified	moderate[2] 752600.2,1	Right instrument panel and below	Probable	Autopsy
15	Hematoma {hemorrhage}, subgaleal, diffuse over frontal, left and right parietal, left and right posterior parietal and occipital scalp	minor 190402.1,0	Head restraint, front right seat	Probable	Autopsy
16	Contusions right forehead	minor 290402.1,7	Right instrument panel and below	Probable	Autopsy
17 18	Contusions both eyes, not further specified	minor 297402.1,1 297402.1,2	Right instrument panel and below	Probable	Autopsy
19	Contusion, 5.1 cm (2 in), curvilinear right cheek	minor 290402.1,1	Right instrument panel and below	Probable	Autopsy
20	Contusion, 5.1 cm (2 in), left cheek	minor 290402.1,2	Right instrument panel and below	Probable	Autopsy
21	Laceration outer right eye, not further specified	minor 290600.1,1	Right instrument panel and below	Probable	Autopsy
22	Contusions, 7.6 cm and 12.7 cm (3 & 5 in), right breast, not further specified	minor 490402.1,1	Right instrument panel and below	Probable	Autopsy
23	Contusion, 15.2 cm (6 in) left breast, not further specified	minor 490402.1,2	Right instrument panel and below	Probable	Autopsy
24	Contusion anterior {front} right upper arm, not further specified	minor 790402.1,1	Right instrument panel and below	Probable	Autopsy
25	Abrasion posterior right upper arm, not further specified	minor 790202.1,1	Seat back, front right passenger's	Probable	Autopsy
26	Contusions, 1,3 and 10.2 cm (0.5 & 4 in) posterior right upper arm, not further specified	minor 790402.1,1	Seat back, front right passenger's	Probable	Autopsy
27	Abrasion dorsum {back} of right hand, not further specified	minor 790202.1,1	Right instrument panel and below	Probable	Autopsy
28	Contusion dorsum {posterior} right middle finger	minor 790402.1,1	Right instrument panel and below	Probable	Autopsy
29	Laceration {tear} dorsum {posterior right middle finger	minor 790600.1,1	Right instrument panel and below	Probable	Autopsy

[2] It is unknown whether the dislocation occurred at the acromioclavicular joint or the sternoclavicular joint. For coding purposes, the acromioclavicular joint was used.

Case Vehicle Front Right Passenger Injuries (Continued) IN-06-033

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
30	Contusions, 5.1 to 15.4 cm (2-6 in), anterior (front) left forearm, not further specified	minor 790402.1,2	Right instrument panel and below	Probable	Autopsy
31	Abrasion posterior {back} left forearm	minor 790202.1,2	Seat back, front right passenger's	Probable	Autopsy
32	Contusion, 15.4 cm (6 in), posterior left upper arm, not further specified	minor 790402.1,2	Seat back, front right passenger's	Probable	Autopsy
33	Contusions anterior bilateral thighs, including one 17.8 cm (7 in) on right, not otherwise specified	minor 890402.1,3	Right instrument panel and below	Probable	Autopsy
34	Abrasion left knee, not further specified	minor 890202.1,2	Glove compartment door	Probable	Autopsy
35	Contusions bilateral knees, not further specified	minor 890402.1,3	Glove compartment door	Probable	Autopsy
36	Abrasions bilateral anterior lower legs, not further specified	minor 890202.1,3	Right instrument panel and below	Probable	Autopsy
37	Contusions bilateral anterior lower legs, including one 7.6 x 9.5 cm (3 x 3.75 in) on left	minor 890402.1,3	Right instrument panel and below	Probable	Autopsy
38	Abrasion lateral {outer} right ankle, not further specified	minor 890202.1,1	Right instrument panel and below	Possible	Autopsy

CASE VEHICLE DRIVER KINEMATICS

Immediately prior to the crash, the case vehicle's driver [17-year-old, White (non-Hispanic) female, 168 centimeters and 59 kilograms (66 inches, 130 pounds)] was most likely seated in an upright driving position. She most likely had both hands on the steering wheel and was bracing against the steering wheel. She most likely had her left foot on the floor. The position of her right foot is not known. The driver's seat track was adjusted between its middle and forward position and the seat back was slightly reclined. The driver was not wearing glasses or contact lenses at the time of the crash.

Based on this contractor's vehicle inspection and supported by the EDR data, the case vehicle's driver was not restrained by her manual, three-point, lap-and-shoulder, safety belt system. There was no evidence of load marks on the safety belt or "D"-ring. In addition, the police crash report indicated that the passenger was unrestrained and found in an approximate sitting position on the floor in front of her seat with her legs entrapped under the instrument panel.

***Case Vehicle Driver Kinematics** (Continued)* IN-06-033

Just prior to the crash, the case vehicle had departed the roadway, vaulted and become airborne. As a result, the driver was most likely bracing against the steering wheel with her hands. As the case vehicle touched down, the driver most likely moved forward as well as down and up in her seat. The impact with the telephone utility box most likely caused little or no movement to the driver. The subsequent impact with the clump of trees caused the driver to continue forward along a path opposite the case vehicle's 0 degree direction of principal force as the case vehicle decelerated and her chest impacted the steering wheel, her knees impacted the knee bolster and instrument panel and her face impacted the windshield. The impact to the steering wheel deformed the steering wheel and displaced the steering column forward and upward causing a fracture to the driver's sternum, a bruised heart, a liver laceration, spleen laceration and unknown injury to her large intestine. The driver spilled off the right side of the steering wheel and her right arm impacted the center instrument panel fracturing her right forearm and right upper arm. The impact to the windshield caused lacerations to the central part of the driver's face from ear to ear and on her nose. Her knees impacted and broke the knee bolsters and instrument panel and her right foot loaded into the brake pedal fracturing her right ankle. The driver came off her seat and came to rest in an approximate sitting position on the floor. Her legs were entrapped under the instrument and her right leg was against a hot surface or electrical short that caused a 15.2 centimeter (6 inch) thermal burn from her right knee to her right calf. The driver was removed from the case vehicle by rescue personnel.

CASE VEHICLE DRIVER INJURIES

The case vehicle's driver sustained a police reported "A" (incapacitating) injury. She was transported by ambulance to a hospital and admitted for treatment of her injuries. The table below shows the case vehicle driver's injuries and injury mechanisms. The treating hospital refused to release the driver's medical records related to this crash.

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Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Fracture sternum, not further specified	moderate 450804.2,4	Steering wheel hub and/or spokes and rim	Certain	Interviewee (relative)
2	Contusion {bruised} myocardium {heart}	minor 441002.1,4	Steering wheel hub and/or spokes and rim	Certain	Interviewee (relative)
3	Laceration liver, not further specified	moderate 541820.2,1	Steering wheel hub and/or spokes and rim	Certain	Interviewee (relative)
4	Injury large intestine, not further specified	moderate 540899.2,8	Steering wheel hub and/or spokes and rim	Certain	Interviewee (relative)

Case Vehicle Driver Injuries (Continued) IN-06-033

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
5	Laceration {damage} spleen, not further specified	moderate 544220.2,2	Steering wheel hub and/or spokes and rim	Certain	Interviewee (relative)
6	Fracture, comminuted, right humerus, not further specified	serious 752604.3,1	Center instrument panel and below	Probable	Interviewee (relative)
7	Fracture right forearm, not further specified	moderate 751900.2,1	Center instrument panel and below	Probable	Interviewee (relative)
8	Fracture right ankle, not further specified	moderate 852002.2,1	Floor, foot controls	Probable	Interviewee (relative)
9	Laceration {cut}, 6.4 to 7.6 cm (2.5-3 in), forehead, vertically oriented	minor 290602.1,7	Front left windshield's glazing	Probable	Interviewee (relative)
10 11	Lacerations, 2.5 cm (1 in) right and left face, nose to ears, bilaterally, stitches required	minor 290602.1,1 290602.1,2	Front left windshield's glazing	Probable	Interviewee (relative)
12	Burn, thermal, 15.2 cm (6 in), lateral right lower leg–knee to calf, requiring skin graft	minor 892006.1,1	"Non-contact", burned by unk component	Probable	Interviewee (relative)

CASE VEHICLE BACK RIGHT PASSENGER KINEMATICS

Immediately prior to the crash, the case vehicle's back right passenger [18-year-old, White (non-Hispanic) female, 173 centimeters and 57 kilograms (68 inches 125 pounds)] was most likely seated in an upright position with here feet on the floor. The position of her hands and arms is not known. Her seat track and seat back were not adjustable.

Based on this contractor's vehicle inspection, the case vehicle's back right passenger was not restrained by her manual, three-point, lap-and-shoulder, safety belt system. There was no evidence of load marks on the safety belt assembly. The damage to the front right passenger's seat back also indicated the passenger was not restrained. In addition, the police crash report indicated that this passenger was unrestrained.

Just prior to the crash, the case vehicle had departed the roadway, vaulted and become airborne. As a result, the back right passenger was likely bracing against the front right seat back with her hands. As the vehicle touched down, the passenger most likely moved forward as well as down and up in her seat and most likely contacted the back of the front right seat. The impact with the telephone utility box most likely caused little or no movement to the back right passenger. The subsequent impact with the clump of trees caused the back right passenger to continue forward along a path opposite the case vehicle's 0 degree direction of principal force as the case vehicle decelerated and her face, torso and legs loaded into the front right seat back pushing the

seat back extensively forward (**Figure 13**). The back right passenger most likely ramped over the seat back and impacted her head on the windshield header causing facial fractures and a traumatic brain injury. The back right passenger rebounded and as the case vehicle rotated clockwise, she most likely contacted the right rear door. She was found lying face up across the back seat with her feet in the floor pan behind the driver's seat. She was removed from the case vehicle by rescue personnel.

Figure 13: Damage to front right passenger's seat back due to loading by unrestrained back right passenger

CASE VEHICLE BACK RIGHT PASSENGER INJURIES

The case vehicle's back right passenger sustained a police reported "A" (incapacitating) injury. She was air lifted from the scene to a hospital and admitted for treatment of her injuries. The table below shows the back right passenger's interviewee reported injuries and injury mechanisms. The treating hospital refused to release the back right passenger's medical records related to this crash. The back right passenger subsequently died of her injuries.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Traumatic brain injury, not further specified	unknown 115999.7,0	Windshield roof header, front right passenger's	Probable	Interviewee (friend)
2	Fractures, facial, not further specified	minor 250400.1,9	Windshield roof header, front right passenger's	Probable	Interviewee (friend)

GENERAL MOTORS BULLETIN 1686453 IN-06-033

<- Back | Forward -> | **Document ID# 1686453** | Feedback | Print

Subject: **Customer Satisfaction - A/C System Wiring or Dual Stage Airbag Module Wiring #05034A - (07/22/2005)**

Models: **2005 CHEVROLET COBALT**
2005 PONTIAC PURSUIT

THIS BULLETIN IS BEING REVISED TO INCLUDE ADDITIONAL LABOR TIME IN THE EVENT THAT THE VEHICLE IS BROUGHT IN WITH AN INOPERATIVE A/C SYSTEM. DISCARD ALL COPIES OF BULLETIN 05034 ISSUED MAY 2005.

Condition

Certain 2005 Chevrolet Cobalt and Pontiac Pursuit vehicles have one of two conditions, 1) the steering column mounted airbag module wiring may be reversed. The driver's air bag will deploy under the same conditions (see "When Should An Air Bag Inflate?" in your owner's manual) and the vehicle meets the occupant protection requirements of the Motor Vehicle Safety Standards. In the event of a moderate frontal impact, however, the airbag would deploy fully instead of at the reduced level described in your owner's manual, or 2) vehicles equipped with a 2.2L engine (L61) and air conditioning (C67), voltage spikes from abnormal fan switching can damage the air conditioning pressure sensor transducer, resulting in a loss of air conditioning. Damage is more likely to occur if the abnormal fan switching occurs when the vehicle is being driven in city traffic and when the outside temperatures are 70 °F (21 ° C) or higher. The spikes can also cause the engine to operate in a reduced power mode. If this occurs, the Driver Information Center will display "ENG PWR REDUCED", and the maximum throttle opening will permit a speed of about 30 mph (48 km/h).

Correction

Dealers are to 1) modify the circuitry to the airbag module, or 2) install wiring to isolate the voltage spike.

Vehicles Involved

Involved are certain 2005 Chevrolet Cobalt and Pontiac Pursuit vehicles built within these VIN breakpoints:

Year	Division	Model	From	Through
2005	Chevrolet	Cobalt	57500350	57584601
2005	Pontiac	Pursuit	57500219	57584526

Figure 14: General Motors' bulletin for 2005 Chevrolet Cobalt and Pontiac Pursuit vehicle's

Important: Dealers should confirm vehicle eligibility through *GMVIS* (GM Vehicle Inquiry System) prior to beginning program repairs. [Not all vehicles within the above breakpoints may be involved.]

For dealers with involved vehicles, a Campaign Initiation Detail Report containing the complete Vehicle Identification Number, customer name and address data has been prepared and will be loaded to the GM DealerWorld (US) Recall Information, GMinfoNet (Canada) Recall Reports. Dealers will not have a report available if they have no involved vehicles currently assigned.

The Campaign Initiation Detail Report may contain customer names and addresses obtained from Motor Vehicle Registration Records. The use of such motor vehicle registration data for any purpose other than follow-up necessary to complete this program is a violation of law in several states/provinces/countries. Accordingly, you are urged to limit the use of this report to the follow-up necessary to complete this program.

Parts Information

Parts required to complete this program are to be obtained from General Motors Service Parts Operations (GMSPO). Please refer to your "involved vehicles listing" before ordering parts. Normal orders should be placed on a DRO = Daily Replenishment Order. In an emergency situation, parts should be ordered on a CSO = Customer Special Order.

Part Number	Description	Qty/ Vehicle
15785514	Harness, Eng Cool Fan Wrg	1 (for A/C Wiring Repair Only)

Service Procedure

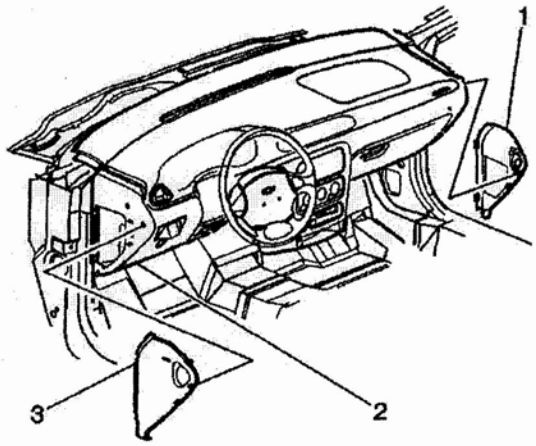
Important: Vehicles involved in this program require only one of the two repair procedures listed in this bulletin.

Determine the appropriate procedure to perform on the vehicle.

- If the vehicle is equipped with a 2.2L engine (L61) *AND* air conditioning (C67), perform only the A/C Wiring (Jumper) Procedure
- If the vehicle is NOT equipped with a 2.2L engine (L61) *AND* air conditioning (C67), perform only the Airbag Wiring Procedure

Figure 15: General Motors bulletin continued

General Motors Bulletin 1686453 *(Continued)* IN-06-033



1. Remove the SIR fuse from the BCM.
2. With a flat-bladed tool, separate the outer trim cover from the I/P.
3. Pull the outer trim cover rearward from the I/P to disengage the locating tabs.
4. Remove the outer trim cover from the I/P.
5. Disconnect the electrical connector from the trim cover.
6. Remove the connector position assurance (CPA) clip from the connector.
7. Disconnect the connector.
8. Carefully peel back about 2 inches (50 mm) of tape from the male side of the connector.
9. Remove the terminal position assurance (TPA) clip from the male side of the connector.
10. Remove the TPA.
11. Back out the BROWN and PINK wires and swap their positions. (BROWN goes into cavity B1, and PINK goes into cavity A1).
12. Back out the TAN and WHITE wires and swap their positions. (TAN goes into cavity B2 and WHITE goes into cavity A2).
13. Install the TPA clip to the male terminal.
14. Rewrap the wiring.
15. Connect the connector and insert the CPA clip.
16. Connect the connector to the trim cover.
17. Align the outer trim cover locating tabs to the opening in the I/P.
18. Push the outer trim cover locating tabs into the I/P until fully engaged.
19. Press the outer trim cover into the I/P until fully secured.
20. Install the fuse for the airbag

A/C Wiring (Jumper) Procedure

Important: If the vehicle is brought in with an inoperative A/C system, replace the A/C refrigerant pressure sensor using the appropriate procedure in SI and then perform the repair below.

1. Open the hood.
2. Remove the engine sight shield.

Figure 16: General Motors' bulletin continued

Notice: DO NOT pull on the wiring clip to remove it from the fan shroud. The fan shroud may be damaged. Use a prying tool between the clip and the ear on the shroud or use diagonal cutters to cut the retainer.

3. Remove the wire retainer from the fan shroud and unplug the electrical connector from the fan.
4. Plug the new jumper into the fan and plug the original fan wiring into the jumper.
5. Press the wiring retainer on the jumper into the hole in the fan shroud where the original wire clip was located. Route the wiring so that it will not come into contact with other parts.
6. Install the engine sight shield.
7. Close the hood.

Courtesy Transportation

The General Motors Courtesy Transportation program is intended to minimize customer inconvenience when a vehicle requires a repair that is covered by the New Vehicle Limited Warranty. The availability of courtesy transportation to customers whose vehicles are within the warranty coverage period and involved in a product recall is very important in maintaining customer satisfaction. Dealers are to ensure that these customers understand that shuttle service or some other form of courtesy transportation is available and will be provided at no charge. Dealers should refer to the General Motors Service Policies and Procedures Manual for Courtesy Transportation guidelines.

Claim Information

Submit a Product Program Claim with the information indicated below.

Repair Performed	Part Count	Part No.	Parts Allow	CC-FC	Labor Op	Labor Hours
Rewire Airbag	N/A	N/A	N/A	MA-96	V1361	0.2
Install A/C Jumper Harness	1	--	*	MA-96	V1362	0.2
Add: Replace A/C Refrigerant Pressure Sensor	1					0.2
Courtesy Transportation for vehicles within the New Vehicle Limited Warranty (US & Canadian Dealers)	N/A	N/A	N/A	MA-96	**	N/A

* The "Parts Allowance" should be the sum total of the current GMSPO Dealer net price plus applicable Mark-Up for the jumper harness needed to complete the repair.

** Submit courtesy transportation using normal labor operations for courtesy transportation as indicated in the GM Service Policies and Procedures Manual for vehicles within the New Vehicle Limited Warranty.

Refer to the General Motors WINS Claim Processing Manual for details on Product Recall Claim Submission.

Figure 17: General Motors' bulletin continued

GM Vehicle Inquiry System
Summary

Home - Summary - Claim History - Vehicle Build - Vehicle Component - Delivery Information - Dealer Information - Service Contract - Warranty Block - Branded Title

Help

VIN :	1G1AK52F657

VEHICLE INFORMATION

Merchandising Model :	1AK69 -2005 COBALT 4-DOOR SEDAN	Warranty Start Date :	10/06/2005
BARS Order Type :	70 - RETAIL - STOCK		
Delivering Dealer :		Selling Source :	13 - CHEVROLET
		Site Code :	
		Business Associate Code :	

Service Contract :	Yes	Branded Title :	No	Warranty Block :	No	PDI Status :	Paid

REQUIRED FIELD ACTIONS

Type	Number	Description	Posted Date	Status
RC	05034	A/C SYSTEM WIRING OR DUAL STAGE AIRBAG MODULE WIRING	N/A	Closed

SERVICE INFORMATIONAL ITEMS

Vehicle Has No Current Record Of Outstanding Service Information

ON STAR AND XM SATELLITE RADIO INFORMATION

Vehicle Has No Associated On Star or XM Radio Information.

APPLICABLE WARRANTIES

Description	Effective Date	Effective Odometer	End Date	End Odometer
36/36000 BUMPER TO BUMPER	10/06/2005	405 miles	10/06/2008	36405 miles
72/100000 SHEET METAL COVERAGE RUST THROUGH	10/06/2005	405 miles	10/06/2011	100405 miles
96/80000 FEDERAL EMISSION CATALYTIC CONV. AND PCM	10/06/2005	405 miles	10/06/2013	80405 miles
36/36000 FEDERAL EMISSION	10/06/2005	405 miles	10/06/2008	36405 miles
60/60000 POWERTRAIN - U.S.	10/06/2005	405 miles	10/06/2010	60405 miles

CLAIM HISTORY

R.O Date	R.O Number	Type	Labor Operation	Odometer Reading
01/02/2006	082152	#	V1362 - 05034 - INSTALL A/C JUMPER HARNESS	9058 miles

Figure 18: Case vehicle's GM Vehicle Inquiry System Summary report

CDR File Information

Vehicle Identification Number	1G1AK52F657******
Investigator	
Case Number	
Investigation Date	
Crash Date	
Filename	IN06033.CDR
Saved on	Wednesday, November 2006 at 08:01:06 AM
Collected with CDR version	Crash Data Retrieval Tool 2.800
Collecting program verification number	9238B95E
Reported with CDR version	Crash Data Retrieval Tool 2.800
Reporting program verification number	9238B95E
Interface used to collected data	Block number: 00 Interface version: 4A Date: 11-08-05 Checksum: 7500
Event(s) recovered	Non-Deployment

SDM Data Limitations

SDM Recorded Crash Events:
There are two types of SDM recorded crash events. The first is the Non-Deployment Event. A Non-Deployment Event is an event severe enough to "wake up" the sensing algorithm but not severe enough to deploy the air bag(s). It can contain Pre-Crash and Crash data. The SDM can store up to one Non-Deployment Event. This event can be overwritten by an event that has a greater SDM recorded vehicle forward velocity change. This event will be cleared by the SDM after the ignition has been cycled 250 times.
The second type of SDM recorded crash event is the Deployment Event. It also can contain Pre-Crash and Crash data. The SDM can store up to two different Deployment Events, if they occur within five seconds of one another. Deployment Events cannot be overwritten or cleared from the SDM. Once the SDM has deployed the air bag, the SDM must be replaced.
The data in the Non-Deployment Event file will be locked after a Deployment Event, if the Non-Deployment Event occurred within 5 seconds before the Deployment Event unless a Deployment Level Event occurs within 5 seconds after the Deployment Event, then the Deployment Level Event will overwrite the Non-Deployment Event file.

SDM Data Limitations:
-SDM Recorded Vehicle Forward Velocity Change reflects the change in forward velocity that the sensing system experienced during the recorded portion of the event. SDM Recorded Vehicle Forward Velocity Change is the change in velocity during the recording time and is not the speed the vehicle was traveling before the event, and is also not the Barrier Equivalent Velocity. This data should be examined in conjunction with other available physical evidence from the vehicle and scene when assessing occupant or vehicle forward velocity change. For Deployment Events and Deployment Level Events, the SDM will record 220 milliseconds of data after deployment criteria is met and up to 70 milliseconds before deployment criteria is met. For Non-Deployment Events, the SDM will record up to the first 300 milliseconds of data after algorithm enable. The minimum SDM Recorded Vehicle Forward Velocity Change, that is needed to record a Non-Deployment Event, is 5 MPH.
-Maximum Recorded Vehicle Velocity Change is the maximum recorded velocity change in the vehicle's combined "X" and "Y" axis.
-Calculated Principal Direction of Force (PDOF) is the arctangent of the maximum observed lateral velocity change divided by the maximum observed longitudinal velocity change. PDOF is displayed where zero degrees is located at the front of the vehicle, with 90 degrees is displayed to the right side of the vehicle and so on, clockwise around the vehicle.
-Event Recording Complete will indicate if data from the recorded event has been fully written to the SDM memory or if it has been interrupted and not fully written.
-SDM Recorded Vehicle Speed accuracy can be affected if the vehicle has had the tire size or the final drive axle ratio changed from the factory build specifications.
-Brake Switch Circuit Status indicates the status of the brake switch circuit.
-Pre-Crash Electronic Data Validity Check Status indicates "Data Invalid" if the SDM receive an invalid message from the module sending the pre-crash data.
-Driver's and Passenger's Belt Switch Circuit Status indicates the status of the seat belt switch circuit. The Passenger Belt Switch Circuit Status for 2006 Chevrolet Cobalt Sport Coupe (AP) model vehicles, with the option package that includes Recaro brand seats (RPO ALV), will always report a default value of "Buckled".
-The Time Between Non-Deployment and Deployment Events is displayed in seconds. If the time between the two events is greater than 5 seconds, "N/A" is displayed in place of the time. If the value is negative, then the Deployment Event occurred first. If the value is positive, then the Non-Deployment Event occurred first.

Figure 19: Case vehicle's CDR File Information and SDM Data Limitations

-If power to the SDM is lost during a crash event, all or part of the crash record may not be recorded.
-The ignition cycle counter relies upon the transitions through OFF->RUN->CRANK power-moding messages, on the GMLAN communication bus, to increment the counter. Applying and removing of battery power to the module will not increment the ignition counter.
SDM Data Source:
All SDM recorded data is measured, calculated, and stored internally, except for the following:
-Vehicle Status Data (Pre-Crash) is transmitted to the SDM, by various vehicle control modules, via the vehicle's communication network.
-The Belt Switch Circuit is wired directly to the SDM.

Figure 20: Case vehicle's SDM data limitations continued

Event Data Recorder Data *(Continued)* IN-06-033

System Status At AE

Vehicle Identification Number	**1AK52F*5*******
Low Tire Pressure Warning Lamp (If Equipped)	Invalid
Vehicle Power Mode Status	Accessory
Remote Start Status (If Equipped)	Inactive
Run/Crank Ignition Switch Logic Level	Inactive
Brake System Warning Lamp (If Equipped)	OFF

System Status At 1 second

Transmission Range (If Equipped)	Fourth Gear
Transmission Selector Position (If Equipped)	Fourth Gear
Traction Control System Active (If Equipped)	Invalid
Service Engine Soon (Non-Emission Related) Lamp	OFF
Service Vehicle Soon Lamp	OFF
Outside Air Temperature (degrees F) (If Equipped)	38.3
Left Front Door Status (If Equipped)	Closed
Right Front Door Status (If Equipped)	Closed
Left Rear Door Status (If Equipped)	Unused
Right Rear Door Status (If Equipped)	Unused
Rear Door(s) Status (If Equipped)	Closed

Pre-crash data

Parameter	-2 sec	-1 sec
Reduced Engine Power Mode	OFF	OFF
Cruise Control Active (If Equipped)	No	No
Cruise Control Resume Switch Active (If Equipped)	No	No
Cruise Control Set Switch Active (If Equipped)	No	No

Pre-crash data

Parameter	-5 sec	-4 sec	-3 sec	-2 sec	-1 sec
Vehicle Speed (MPH)	71	71	71	0	0
Engine Speed (RPM)	2496	2496	2496	0	0
Percent Throttle	Invalid	Invalid	Invalid	Invalid	Invalid
Accelerator Pedal Position (percent)	Invalid	Invalid	Invalid	Invalid	Invalid
Antilock Brake System Active (If Equipped)	Invalid	Invalid	Invalid	Invalid	Invalid
Lateral Acceleration (feet/s²)(If Equipped)	Invalid	Invalid	Invalid	Invalid	Invalid
Yaw Rate (degrees per second) (If Equipped)	Invalid	Invalid	Invalid	Invalid	Invalid
Steering Wheel Angle (degrees) (If Equipped)	Invalid	Invalid	Invalid	Invalid	Invalid
Vehicle Dynamics Control Active (If Equipped)	Invalid	Invalid	Invalid	Invalid	Invalid

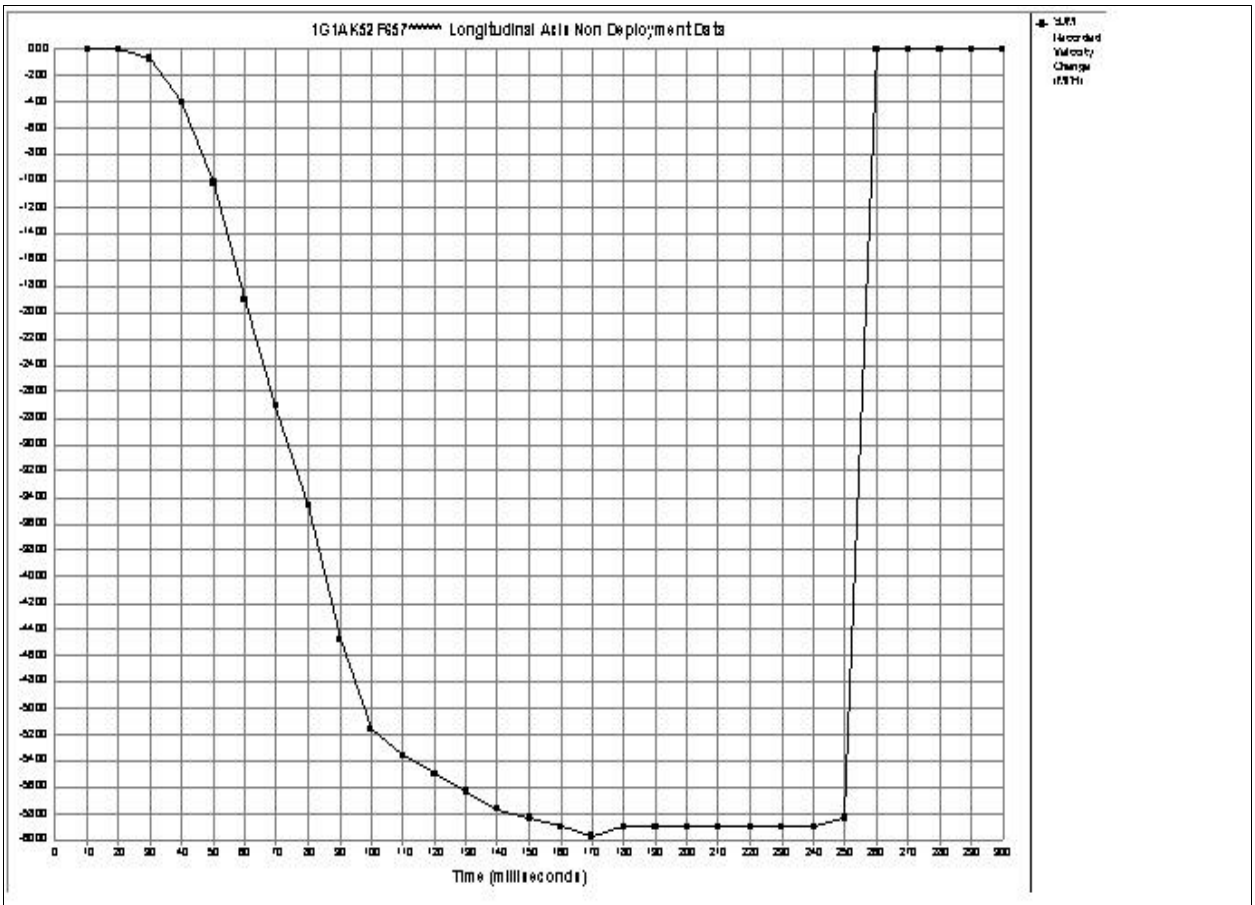
Figure 21: Case vehicle's System Status at AE, System Status at 1 Second and pre-crash data

Event Data Recorder Data *(Continued)* IN-06-033

System Status At Non-Deployment	
Ignition Cycles At Investigation	2784
SIR Warning Lamp Status	OFF
SIR Warning Lamp ON/OFF Time (seconds)	655200
Number of Ignition Cycles SIR Warning Lamp was ON/OFF Continuously	2783
Ignition Cycles At Event	2784
Ignition Cycles Since DTCs Were Last Cleared	254
Driver's Belt Switch Circuit Status	UNBUCKLED
Diagnostic Trouble Codes at Event, fault number: 1	N/A
Diagnostic Trouble Codes at Event, fault number: 2	N/A
Diagnostic Trouble Codes at Event, fault number: 3	N/A
Diagnostic Trouble Codes at Event, fault number: 4	N/A
Diagnostic Trouble Codes at Event, fault number: 5	N/A
Diagnostic Trouble Codes at Event, fault number: 6	N/A
Maximum SDM Recorded Velocity Change (MPH)	59.84
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	170
Driver First Stage Deployment Loop Commanded	No
Driver Second Stage Deployment Loop Commanded	No
Driver Side Deployment Loop Commanded	No
Driver Pretensioner Deployment Loop Commanded	No
Driver (Initiator 1) Roof Rail/Head Curtain Loop Commanded	No
Driver (Initiator 2) Roof Rail/Head Curtain Loop Commanded	No
Driver Knee Deployment Loop Commanded	No
Passenger First Stage Deployment Loop Commanded	No
Passenger Second Stage Deployment Loop Commanded	No
Passenger Side Deployment Loop Commanded	No
Passenger Pretensioner Deployment Loop Commanded	No
Passenger (Initiator 1) Roof Rail/Head Curtain Loop Commanded	No
Passenger (Initiator 2) Roof Rail/Head Curtain Loop Commanded	No
Passenger Knee Deployment Loop Commanded	No
Second Row Left Side Deployment Loop Commanded	No
Second Row Left Pretensioner Deployment Loop Commanded	No
Third Row Left Roof Rail/Head Curtain Loop Commanded	No
Second Row Right Side Deployment Loop Commanded	No
Second Row Right Pretensioner Deployment Loop Commanded	No
Third Row Right Roof Rail/Head Curtain Loop Commanded	No
Second Row Center Pretensioner Deployment Loop Commanded	No
Multiple Event Counter	0
An Event(s) Preceded the Recorded Event(s)	No
An Event(s) was in Between the Recorded Event(s)	No
An Event(s) Followed the Recorded Event(s)	No
The Event(s) Not Recorded was a Deployment Event(s)	No
The Event(s) Not Recorded was a Non-Deployment Event(s)	No
Crash Record Locked	No
Vehicle Event Data (Pre-Crash) Associated With This Event	Yes
Deployment Event Recorded in the Non-Deployment Record	No
Event Recording Complete	Yes
Estimated Principal Direction of Force (PDOF) degrees	5

Figure 22: Case vehicle's System Status at Non-Deployment report

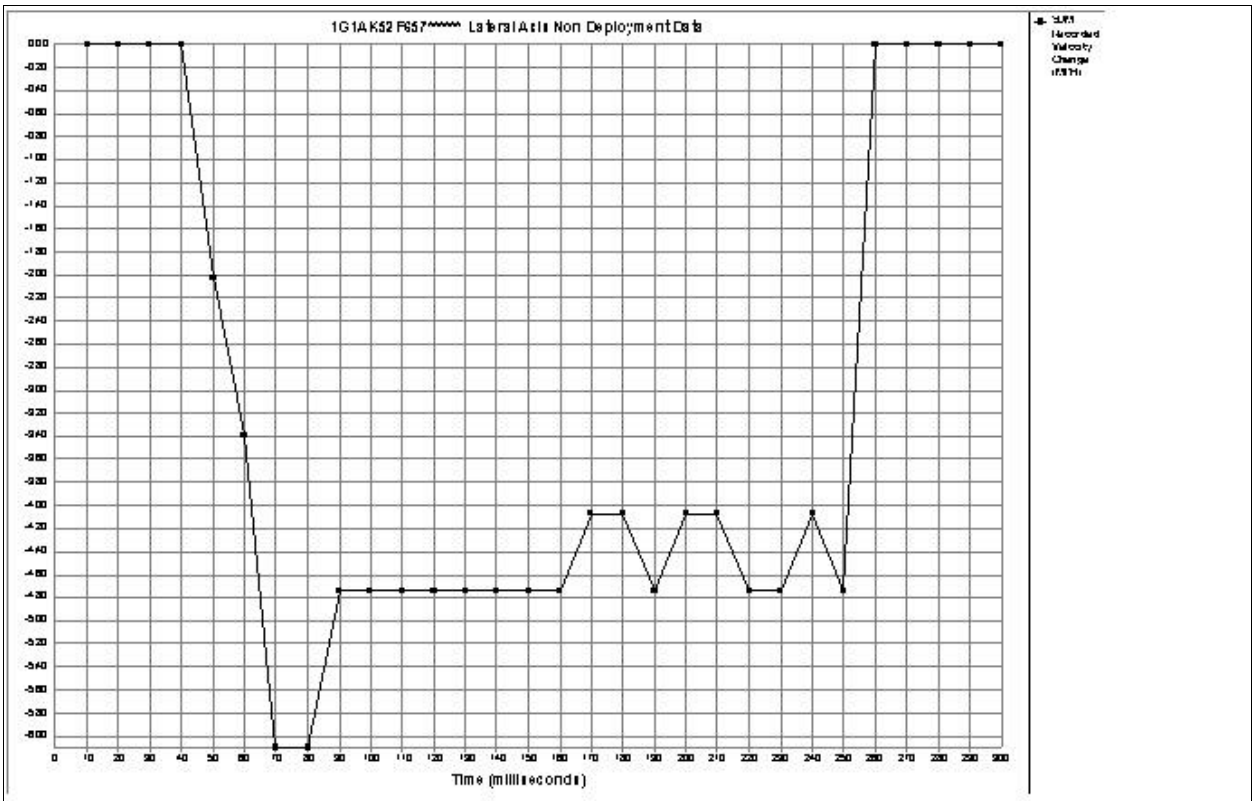
Event Data Recorder Data *(Continued)* IN-06-033



Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Longitudinal Axis Recorded Velocity	0.00	0.00	-0.68	-4.07	-10.17	-18.98	-27.11	-34.57	-44.74	-51.52	-53.55	-54.90	-56.26	-57.62	-58.29
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
Longitudinal Axis Recorded Velocity	-58.97	-59.65	-58.97	-58.97	-58.97	-58.97	-58.97	-58.97	-58.97	-58.29	0.00	0.00	0.00	0.00	0.00

Figure 23: Case vehicle's non-deployment longitudinal velocity change graph

Event Data Recorder Data *(Continued)* IN-06-033



Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Lateral Axis Recorded Velocity Change (MPH)	0.00	0.00	0.00	0.00	-2.03	-3.39	-6.10	-6.10	-4.74	-4.74	-4.74	-4.74	-4.74	-4.74	-4.74
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
Lateral Axis Recorded Velocity Change (MPH)	-4.74	-4.07	-4.07	-4.74	-4.07	-4.07	-4.74	-4.74	-4.07	-4.74	0.00	0.00	0.00	0.00	0.00

Figure 24: Case vehicle's non-deployment lateral velocity change graph

GENERAL MOTORS BULLETIN 1869035 IN-06-033

<- Back | Forward -> | Document ID# 1869035 | Feedback | Print

Subject: **Information on Inadvertent Turning of Key Cylinder, Loss of Electrical System and No DTCs #05-02-35-007A - (10/25/2006)**

Models:
2005-2007 Chevrolet Cobalt
2006-2007 Chevrolet HHR
2005-2006 Pontiac Pursuit (Canada Only)
2007 Pontiac G5
2006-2007 Pontiac Solstice
2003-2007 Saturn ION
2007 Saturn Sky

This bulletin is being revised to add a model year. Please discard Corporate Bulletin Number 05-02-35-007 (Section 02 - Steering).

There is potential for the driver to inadvertently turn off the ignition due to low ignition key cylinder torque/effort.

The concern is more likely to occur if the driver is short and has a large and/or heavy key chain. In these cases, this condition was documented and the driver's knee would contact the key chain while the vehicle was turning and the steering column was adjusted all the way down. This is more likely to happen to a person who is short, as they will have the seat positioned closer to the steering column.

In cases that fit this profile, question the customer thoroughly to determine if this may the cause. The customer should be advised of this potential and should take steps to prevent it - such as removing unessential items from their key chain.

Engineering has come up with an insert for the key ring so that it goes from a "slot" design to a hole design. As a result, the key ring cannot move up and down in the slot any longer - it can only rotate on the hole. In addition, the previous key ring has been replaced with a smaller, 13 mm (0.5 in) design. This will result in the keys not hanging as low as in the past.

Parts Information

Part Number	Description
15842334	Cover, Dr Lk & Ign Lk Key

Figure 25: General Motors Bulletin1869035

CRASH DIAGRAM IN-06-033